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L2: Entry 2 of 5

File: USPT

Jul 8, 2003

DOCUMENT-IDENTIFIER: US 6588122 B2

TITLE: Method for treating surfaces of substrates and apparatus

Brief Summary Text (6):

In EP 0 661 110 B1 a method is disclosed for the oxidation of an object, wherein by irradiating an oxygen-containing fluid with vacuum ultraviolet radiation from a barrier discharge lamp (dielectrically hindered discharge) with encapsulated xenon gas, ozone and activated oxygen is produced by a photochemical reaction between the oxygen-containing liquid and the ultraviolet radiation; the object being treated is brought in contact with the ozone and activated oxygen and oxidized by intervention of vacuum ultraviolet radiation. According to the process the distance "d" of the passage of the ultraviolet radiation emitted by the barrier discharge lamp to the object is to be as short as possible and an oxygen partial pressure p (in kPa) is to be established in the area between the discharge lamp and the object according to a given algorithm.

Current US Cross Reference Classification (1):134/1Current US Cross Reference Classification (2):134/21Current US Cross Reference Classification (3):134/32[Previous Doc](#)[Next Doc](#)[Go to Doc#](#)

## WEST Search History





DATE: Wednesday, May 11, 2005

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	<i>DB=USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=ADJ</i>		
<input type="checkbox"/>	L17	h7-196303	1
<input type="checkbox"/>	L16	L15 and (vacuum or reduced or mtorr)	51
<input type="checkbox"/>	L15	(barrier discharge) same xenon	84
	<i>DB=USPT; PLUR=YES; OP=ADJ</i>		
<input type="checkbox"/>	L14	L13 and mtorr	2
<input type="checkbox"/>	L13	(barrier discharge) and 172 and xenon	48
<input type="checkbox"/>	L12	L8 and kpa	2
<input type="checkbox"/>	L11	L9 and nm	0
<input type="checkbox"/>	L10	L9 and uv	0
<input type="checkbox"/>	L9	L8 and mtorr	1
<input type="checkbox"/>	L8	5510158	38
<input type="checkbox"/>	L7	L6 and vacuum	27
<input type="checkbox"/>	L6	pressure and l1	40
<input type="checkbox"/>	L5	mtorr and l1	0
<input type="checkbox"/>	L4	L3 and l1	1
<input type="checkbox"/>	L3	5510158.pn.	1
<input type="checkbox"/>	L2	L1 and 134/\$.ccls.	5
<input type="checkbox"/>	L1	(barrier discharge) same xenon	44

END OF SEARCH HISTORY

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JP 04 079 325

L16: Entry 6 of 51

File: USPT

Oct 14, 2003

DOCUMENT-IDENTIFIER: US 6631726 B1

TITLE: Apparatus and method for processing a substrate

Brief Summary Text (9):

In an attempt to solve this problem, proposed in Japanese Laid-Open Patent Specification H7-196303 is a method of dry-washing work, irradiating substrate surfaces with vacuum ultraviolet light from a dielectric barrier discharge lamp.

Brief Summary Text (10):

In the case of this washing method according to Japanese Laid-Open Patent Specification H7-196303, in removing organic contaminants which have deposited on substrate surfaces, active oxidative decomposition products are produced by chemical reaction with ultraviolet light rays in vacuum. Namely, in this case, ultraviolet light rays of 172 nm which are irradiated from a dielectric barrier discharge lamp decompose organic substances into products of low molecular weight by destructing chemical bonds in the organic substances, while at the same time activating the decomposition products. At the same time, oxygen in the air is decomposed and activated by the action of the ultraviolet light. Therefore, the activated organic substances are converted into volatile substances such as CO.sub.x, H.sub.2 O, NO.sub.x and so forth by oxidative reactions with active oxygen and ultimately released into the air. As a result, the treated substrate surfaces come to have a smaller contact angle in terms of wettability.

Brief Summary Text (11):

However, since ultraviolet light is consumed for cracking oxygen in the air, an air layer between the discharge lamp and a substrate is increased in thickness to cause an exponential attenuation to the amount of ultraviolet light rays which can reach a substrate surface. Consequently, there occur conspicuous degradations in the capacities of activating organic substances on substrate surfaces and producing active oxygen in the vicinity of substrate surfaces, that is, in the capacity of removing contaminant organic substances by ultraviolet light. Besides, it is only active oxidative decomposition products that are produced by irradiation of an oxygen-containing fluid with ultraviolet light in vacuum. Therefore, depending upon the kinds of organic substances which have deposited on substrate surfaces, it is often found difficult to remove deposited organic contaminants from substrate surfaces simply by oxidative reactions.

Detailed Description Text (4):

A discharge gas is sealed in the quartz glass tube 4, so that, upon applying an ac high voltage between the metal electrode 6 and the metal mesh electrode 7, discharge plasma (dielectric barrier discharge) occurs across a dielectric between the inner and outer tubes 2 and 3, and, by this discharge plasma, atoms of the discharge gas are excited into a plasma discharge state. Plasma discharge emission takes place as the discharge gas atoms in the plasma state return to a normal state. At this time, the emission spectrum varies depending upon the nature of the discharge gas which is sealed in the quartz glass tube 4. In the case of a xenon (Xe) gas, for example, monochrome light having a center wavelength at 172 nm is emitted. In a case where argon (Ar) gas is used as a discharge gas, the emission has a center wavelength of 126 nm which is shorter than that of a low-pressure mercury lamp. The metal electrode 6 functions as a reflector plate, while the metal

mesh electrode 7 functions substantially as a transparent electrode. Therefore, ultraviolet light of short wavelength is irradiated from the side of the outer tube 3. In this instance, for example, the charged pressure of xenon gas is approximately 350 torr.

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